

# SPECIFICATION

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## [APPARATUS FOR VENTING A TRANSMISSION]

### Cross Reference to Related Applications

This application is a continuation patent application of International Application No. PCT/SE01/00792 filed 10 April 2001 which was published in English pursuant to Article 21(2) of the Patent Cooperation Treaty, and which claims priority to Swedish Application No. 0001994-3, filed 25 May 2000. Both applications are expressly incorporated herein by reference in their entireties.

### Background of Invention

[0001] TECHNICAL SPHERE: The present invention relates to methods and devices for the ventilation of a transmission case intended to hold liquid lubricant for transmission components and in which a residual volume of air in the transmission case is connected to atmospheric pressure by way of a passage.

[0002] BACKGROUND: In addition to transmission parts, a transmission case such as a gearbox also contains space for lubricating oil and air. The volume of air changes when the temperature of the transmission parts, the oil and/or the air, rises or falls. Temperature variations from  $-40^{\circ}\text{C}$  to approximately  $+120^{\circ}\text{C}$  can occur. A connection between the volume of air inside the transmission case and the outer atmosphere is required in order to equalize the pressure so that neither excess pressure nor negative pressure is formed in the transmission case as such pressures can be harmful to the seals of the case. A hole is generally bored in the upper part of the transmission case and is provided with a nipple and a short length of hose, or a nipple with a protective cover or filters that are intended to prevent water or dirt from getting into the transmission case. The exchange of air with the surroundings is referred to as breathing and may amount to as much as approximately ten liters in the

case of a large truck. The exchange of air is achieved primarily when air is drawn into the gearbox, as it cools after driving, or on starting and subsequent driving on a long, steep incline. It has emerged that contamination such as sand and salt can get into the gearbox through breathing and can cause damage to bearings, gears, friction surfaces and seals. Filters that can be used to trap particles may furthermore be provided with an overflow valve, which runs the risk of sticking in the open position and letting in contamination.

## Summary of Invention

- [0003] One purpose of the invention is to produce a ventilation device that is maintenance-free and which effectively reduces the amount of dirt that might reach the inside of the transmission case.
- [0004] In at least one embodiment, the invention takes the form of a passage includes a first section with a certain flow area and a second section with, by comparison, flow area that is larger by at least approximately 50%. The first section is situated between atmosphere and the second section and a compressed air source is connected to the passage between the transmission case and the first section. This design, according to the invention, provides a simple and effective particle trap that can be automatically blown clean of trapped dirt particles.

## Brief Description of Drawings

- [0005] The invention will be described in more detail below with reference to an exemplary embodiment, which is shown in the drawing attached, in which:
- [0006] Fig. 1 is a schematic diagram, which in a side view shows a transmission case with a ventilation device according to the invention, and
- [0007] Fig. 2 shows, on a larger scale, a section through the ventilation device shown in Figure 1.

## Detailed Description

- [0008] The gearbox 10 shown in Fig. 1 includes a transmission case 11 having, among other things, an output shaft 12; and is as well provided with bearings, shafts, gears, synchromesh elements and operating elements for shifting between various working

[0010] The opposite end of the casing part 20 accommodates a bottle-shaped end-piece 26 with a tapered neck opening 27 remote from the casing part. Both connections 21, 22 are provided with conical ridging for securing the hose sections 15, 17.

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[0013] The invention must not be regarded as being confined to the exemplary embodiments described above, a number of other variants and modifications being conceivable within the scope of the following claims.